The Financial Premium and Real Cost of Bureaucrats in Businesses⋆

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Abstract

This paper studies the financial premium (or tax) and aggregate productivity losses (or gains) of bureaucrats in businesses. It does so, using a novel firm-level database that contains information about the ownership structure of European firms during the period 2010-2016. The paper shows that firms with public authorities (PAs) as direct shareholders (SOEs) get, on average, subsidized access to finance compared to private-owned enterprises (POEs). A 1 p.p increase in government direct shareholding reduces the average cost of finance (e.g., debt and equity) by 0.02 percent. The largest subsidies appear in the agriculture, energy, water, transport, and finance sectors. Counterfactual analyses conducted to quantify the aggregate productivity gains from removing State-ownership distortions show that real gains are maximized when the reform involves an initial targeted approach that focuses on removing unproductive SOEs from the market coupled with a subsequent complementary reform that eliminates the remaining distortions in financial markets before reallocating the released resources towards more productive firms.

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"*The relationship between governments and businesses is always changing. After 1945, many countries sought to rebuild society using firms that were state-owned and -managed. By the 1980s, faced with sclerosis in the West, the state retreated to become an umpire overseeing the rules for private firms to compete in a global market—a lesson learned, in a fashion, by the communist bloc. Now a new and turbulent phase is underway, as citizens demand action on problems, from social justice to the climate. In response, governments are directing firms to make society safer and fairer, but without controlling their shares or their boards. Instead of being the owner or umpire, the state has become the backseat driver. This bossy business interventionism is well-intentioned. But, ultimately, it is a mistake.*"

—The Economist, Jan 15th, 2022 edition. Leaders, Business and Government section. Welcome to the Era of the Bossy State.

1. Introduction

In 1995, the World Bank released a report that starts as follows..."Bureaucrats are still in business despite more than a decade of divestiture efforts and the growing consensus that governments perform less well than the private sector in a host of activities" (World Bank, 1995). More than two decades later, the presence of the State as a market player, both in the local and global economy, is still pervasive.[1] The latter seems paradoxical given the limited fiscal space of many governments around the world and the convincing theories (see Shleifer 1998 for a literature review) that coupled with scattered firm-level evidence (Ehrlich et al., 1994b; Karpoff, 2001; Boeing et al., 2016; Wei et al., 2017, Harrison et. al. 2019, among others) show that on average State-owned enterprises (SOEs) underperform private-owned firms (POEs).[2]

[1] Dollar and Wei (2007), Hsieh and Klenow (2009), Bai et al. (2016), Cong et. al. (2019), Huang et al. (2020), and Song et al. (2011).

[2] Shleifer (1998) discusses the desirable scope for a benevolent government. Under the assumption that the government is benevolent, State ownership can only lead to higher welfare outcomes if there is low contract enforcement, innovation is insignificant, competition is very limited, and firm reputation is irrelevant. Besides this very specific setting, government ownership is not only inferior to private ownership in terms of maximizing social welfare but also it is an inferior intervention

Evidence about the real aggregate effect of State participation in the economy is surprisingly thin and, primarily, focused on China (Hsieh and Klenow, 2009; Whited and Zhao, 2021). While China offers the textbook case for studying the economic implications of having a State heavily involved in the economy, the specificities of the Chinese case impede establishing a broader cross-country and cross-sectoral characterization of this issue. Further, there are other reasons often related to the reliability of the data needed to conduct this type of analysis, which explains the little advancement of this literature at the global level (Diewert, 2018).

Quantifying the impact of the State footprint on the economy is challenging from a measurement point of view. Quasi-fiscal activities undertaken by SOEs are not always fully disclosed (Olugbade et al., 2021),[3] and additional transparency efforts are still needed in specific areas (Christiansen, 2013).[4] Further, several SOEs exercise both commercial and non-commercial functions and, despite that public authorities are often mindful of the need to prevent cross-subsidization, it is often difficult to avoid it in practice (Christiansen, 2013). All of these issues coupled with mismeasurement problems associated with intentional misreporting due to rent-seeking activities or political patronage (Malatesta and DeWenter, 2001), indivisibilities in the use of public capital, and free-riding problems among government agencies or SOEs subsidiaries creates difficulties in analyzing the economic effect of State ownership through real channels (e.g., output, labor, capital, materials, wages, and rents).

The present paper advances the literature on several fronts. First, to shed light on

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compared to government contracting and regulating. Moreover, when the benevolence assumption is not fulfilled so that government officials maximize personal and political gains instead of social welfare, government ownership can lead to even more pervasive economic outcomes.

[3]A recent report by the IMF shows that less than half of 18 surveyed countries inform their Parliament about government support to SOEs, while a fewer number of them publish this information

[4]This includes more consistent and systematic reporting of non-commercial or financial assistance received from the State that goes beyond what international accounting standards may require as part of financial disclosure, relevant information to assess competitive neutrality concerns (e.g. procurement mechanisms and contracts, funding and financing modalities for SOEs, and regulatory exemptions), disclosure of control structures where the State may retain golden shares or special shareholder controlling rights, and board nomination practices, especially where the State retains the power to designate individual board members.

the potential distortionary effect of State presence in the economy at the global level, we work with a sample of twenty-four European countries during the period 2010-2016.[5] We focus the analysis on the Eurozone as there has been a lot of government interventions to rescue private firms following the global financial crisis of 2008/9. Second, to deal with measurement concerns, we focus the analysis on the liabilities (e.g., debt and equity) that back firms' purchases of inputs and factors of production (instead of real variables such as labor, capital, and materials) to examine if State-owned enterprises (SOEs) receive preferential treatment. In doing so, we follow Whited and Zhao (2021), who develop a framework that shows that real (mis)allocation mirrors finance (mis)allocation, and thus, it allows us to explore the real consequences of the State footprint through the finance channel. Third, leveraging the theoretical underpinnings of our analysis, we constructed counterfactual allocations where SOEs were shut down under alternative assumptions about distortions in credit markets to identify the SOEs reform that maximizes output at the aggregate level.

Since several reasons can theoretically rationalize both the existence of a State-ownership premium, as well as a State-ownership tax, exploring the (un)distortionary effects of State ownership on the cost of finance is therefore an empirical question. Theories in favor of a State-ownership premium often rely on the benefits of having a market regulator as a shareholder of a firm, the advantages of having the State as a lender of last resort, and SOEs' favored access to subsidized inputs. Those supporting a State-ownership tax frequently rely on the poor performance of SOEs compared to POEs, as well as sovereign default risk concerns. It is, therefore, the objective of this paper to explore empirically this issue and shed light on the potential consequences for the real economy.

To explore the (un)distortionary finance and real effect of State ownership in the economy, we construct a novel firm-level dynamic database that provides a charac-

[5] Austria, Belgium, Estonia, Finland, France, Germany, Luxembourg, Portugal, Slovakia, Slovenia, Spain, Italy, Bulgaria, Norway, Czech Republic, Hungary, Romania, Poland, Croatia, Bosnia, Montenegro, North Macedonia, Serbia, and Ukraine.

terization of the ownership structure of a firm. We relied on the Vintage Ownership Disks (VODs) from Bureau van Dijk, which offer information on ownership links across firms and, most importantly, from firms to governments. SOEs are defined as firms with government entities as direct shareholders. We use the government's total direct ownership stake–which accounts for span-of-control issues related to delegation of authority–as our main explanatory variable. Importantly, the nature of our database allows us to control for firm-, industry-time-, and country-fixed effects and thus tease out the effect of potential cofounded factors embedded in the distortion measures such as risk, markups, technological and quality differences across firms.[6]

We find that SOEs face a lower cost of finance than POEs. A 1 percentage point increase in government direct shareholding results, on average, in a financial subsidy of 0.02 percent. The largest subsidies are observed in sectors such as agriculture, energy, water, transport, and finance. Given that SOEs absorb, on average, an excessive amount of financial resources relative to comparable POEs, we then construct counterfactual allocations where all or subsets of the SOEs are dismantled. Our goal is to evaluate whether these interventions, by reallocating financial resources from the public to the private sector, lead to an increase in aggregate productivity and ultimately output.

The main result shows that countries may gain or lose from an indiscriminate

[6]Part of the attraction of the Hsieh-Klenow and Whited and Zhao framework is their tractability and apparent ease of replicability. However, their static nature and restrictive theoretical underpinnings underlying their models–and their derived interpretation of TFPR dispersion as uniquely capturing distortions and misallocation–have been challenged as empirically unrealistic by many scholars in the literature. These challenges do leave researchers uncertain as to what part of the HK wedges truly captures economic distortions instead of capturing variations in risk (Doraszelski and Jaumandreu 2013), markups (Haltiwanger, Kulick and Syverson, 2018), quality (Krishna, Levchenko, and Maloney 2018), technology (Kasahara, Nishida, and Suzuki 2017), adjustment cost in the capital stock (Asker, Collard-Wexler, and De Loecker 2016), and informational asymmetries (David, Venkateswaran, Cusolito and Didier 2021) across firms. Recent research by David and Venkateswaran (2019) shows that after accounting for markups, technological differences, adjustment costs in the capital, and informational asymmetries, on average, at least 50 percent of the dispersion in the average product of capital within each country—a standard measure of misallocation–remains unexplained. Thus, suggesting a non-trivial role for additional and potentially distortionary factors like State-driven heterogeneous policy treatment in explaining allocative inefficiencies that dampen productivity and output.

dismantlement of SOEs, depending on the relative performance of SOEs compared to POEs, and the extent of financial market distortions that persist in the economy. When distortions are severe, the resources freed up by the SOEs will be inefficiently allocated to POEs, potentially leading to lower aggregate productivity and output. Moreover, if SOEs were over-performing private firms, the productivity losses would be magnified. We show that targeted interventions dismantling underperforming SOEs maximize the number of countries gaining from SOE reform. In addition, productivity gains at the aggregate level will increase if the target reform is followed by complementary reforms that remove reminder distortions before reallocating the freed resources towards more productive firms.

The remainder of the paper is organized as follows. Section 2 presents the literature review. Section 3 describes the data. Section 4 presents the model. Section 5 describes the identification strategy. Section 6 discusses the empirical results. The final section concludes.

2. Literature Review

Our paper relates to a large body of research, pioneered by Hsieh and Klenow (2009), HK hereafter, which focuses on the effects of economic distortions (e.g., adjustment costs, taxes, regulations, trade barriers, property rights) on factor misallocation and aggregate productivity (see Cusolito and Maloney, 2018; Restuccia and Rogerson, 2008, for a review). Recent work by David and Venkateswaran (2019) and David et al. (2020) show that after accounting for markups and technological differences, on average, at least 50 percent of the dispersion in the average product of capital within each country—a standard measure of misallocation--remains unexplained. Thus, suggesting a non-trivial role for additional—and potentially distortionary factors in explaining allocative inefficiencies that dampen productivity growth. While most of the literature has put attention to distortions that affect factor markets, little has been said about financial markets.[7]

[7]The literature focuses on adjustment costs in labor and capital (Hopenhayn and Rogerson, 1993), taxes (Guner et al., 2008), informality (Matias et al., 2013), government regulations (Brandt et al.,

Early work based on calibrated models using firm-level data for China, Colombia, Mexico, South Korea, and the U.S explores the linkages between finance and real misallocation. In this strand of research, Buera et al. (2011) show that financial frictions distort capital and entrepreneurial talent allocation across production units, thereby decreasing aggregate TFP. Sectors with larger operation scales are more financially dependent and, therefore, they are disproportionately more vulnerable to the real effects of financial distortions. Related research by Midrigan and Xu (2014) finds that financial frictions cause sizable TFP losses from inefficiently low entry levels and technological upgrading. They also cause factor misallocation and TFP losses, although to a lesser extent. Gopinath et al. (2017) study the interaction of capital adjustment costs and size-dependent financial frictions in determining productivity losses from capital misallocation in Europe. They show that the decline in real interest rates attributed to the euro convergence process leads to important real losses, as capital inflows were allocated to unproductive firms. More recently, Whited and Zhao (2021) make an important contribution to this literature by extending the HK framework to estimate TFP losses from the misallocation of financial liabilities in China and the U.S. The authors show that financial distortions cause factor misallocation and TFP losses through two different channels. They inefficiently change the debt-to-equity mix. And they reduce the total amount of financial resources firms have access to.

Another strand of research explores the economic impact of State ownership on misallocation and TFP growth. Dollar and Wei (2007) present evidence of capital misallocation in China because due to State ownership. Hsieh and Klenow (2009) document that more than one-third of the aggregate TFP gains from removing distortions in China comes from SOEs exit and the reallocation of resources toward productive POEs. This literature is also related to the large body of firm-level research showing that on average SOEs are less profitable than POEs. Early work by Ehrlich et al.

2013; Fajgelbaum et al., 2015; Hsieh and Moretti, 2015), property rights (Banerjee, 1999; Besley and Ghatak, 2010; Deininger and Feder, 2001), trade protection (Pavcnik, 2002; Trefler, 2004), and financial frictions (Buera et al., 2011; Midrigan and Xu, 2014) to mention a few.

(1994b) shows that State ownership can lower firms' long-run annual rate of productivity growth, but not necessarily their levels in the short run. Their results appear to be independent of whether the firms operate under apparently more or less competitive or regulated markets. And whether they differ in production scale. Harrison et al (2019) show that Chinese SOEs and privatized SOEs significantly under-perform compared to POEs.

Excluding the case of China, firm-level evidence about the finance-real misallocation nexus due to State ownership is surprisingly thin. Empirical studies for China show that factor misallocation mirrors the distortive effects of state ownership in financial markets. In this strand of research, Song, Storesletten, and Zilibotti (2011), Bai, Hsieh, and Song (2016), Cong et. al. (2019), and Huang, Pagano, and Panizza (2020) study the allocation of credit between SOEs and POEs following the 2009 national government stimulus package implemented to deal with the financial crisis. The evidence shows that private-owned banks shifted the credit supply from POEs, which were perceived with higher levels of default risk due to the lack of government guarantees, towards SOEs. Further, the authors find crowding-out effects, as private investments shrunk relatively more in locations with higher growth rates of public debt. The distortions in the financial markets and resulting credit constraints for POEs force the latter to change the debt-to-equity mix and rely more than optimally on internal resources to cope with the credit constraint. Similarly, Gen and Pan (2021) study the effect of asset management regulations imposed by the Chinese national government in 2018. The authors document that SOEs face lower credit costs than POEs. Following the 2018 new regulatory framework, which tightened credit conditions, the SOEs premium increased five-fold, as private investors shift from POEs' bonds to SOEs' bonds based on lower default risk associated with SOEs. However, from a real point of view, POEs were more productive than SOEs. And as a result, credit at the aggregate level was misallocated. It is, therefore, the objective of this paper, to provide a broader characterization of the cross-country and cross-sectoral pattern of state-ownership finance misallocation and its implied consequences on aggregate productivity losses if any.

3. Data

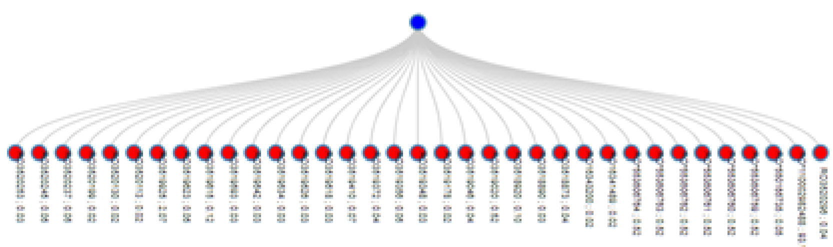
Our data come from the firm-level ORBIS raw database, which is compiled and sold by the Bureau van Dijk Electronic Publishing (BvD). The raw files are broadly structured into two separate modules--historical ownership raw database and financial raw database--that can be matched through the BvD firm identifier. Ownership and administrative raw firm-level data are initially collected through different sources depending on the country and the year (see BvD 2018 and 2011 for details). We focus the analysis on twenty-five European countries during the period 2010-2016 as BvD' source of information is the AMADEUS database. This database has been widely used for research purposes, given its cross-country coverage and quality (Gopinath et. al., 2017; Kalemli-Ozcan et al., 2015).

Historical ownership module. To create our historical ownership database, we follow Cusolito (2020) and we work with BvD Links and Entities' historical files (often known as Vintage files). The Links files contain all the information of a link between a subsidiary (firm) and its parents (shareholders). This includes the ownership percentage, source of information, and date the ownership information was validated. The Entities file contains limited information on each entity, whether the firm is a subsidiary or a parent in the Links files, the BvD identifier, entity name, and entity type.

To develop our historical ownership database, we proceed as follows. First, we clean the raw Vintage files and eliminate branches. Appendix A presents a detailed description of all the steps we implement to clean the raw files. Second, we merge the Links and Entities files using the BvD identifier. Third, we identify the shareholders that are public authorities using BvD's entity category S--Public authorities, States, or Governments--which includes governmental agencies, departments, and local authorities. Fourth, we identify all the shareholders that at the first level of the ownership tree (direct ownership) are public authorities and belong to the same country using the ISO code embedded in the BvD identifier. Fifth, due to span-of-control problems, it is quite often to find that governments spread their ownership stakes across several public agencies. Thus, we collapse all the shares belonging to all the public authorities of a specific country, as in the end, there is only one main shareholder, which is the State (see Figure 1 for an example). Sixth, we distinguish between domestic and foreign shareholders by comparing the ISO country code of the firm with that of the shareholder. If both ISO codes coincide, we classify the public authority as a domestic shareholder.

Finally, given that we measure direct state ownership and, therefore, we don't look into State participation at higher layers of the ownership tree, our measures provide a lower bound for State ownership. The advantage of following this approach is that direct ownership links are often considered stronger channels of decision than indirect ownership links. Consequently, we focus our analysis on the most important channel of influence behind firm ownership.

Figure 1: Example of Ownership Tree



Note: red circles represent public authorities, blue circles represent private-owned shareholders.

Historical Financial module To prepare our financial module, we follow Cusolito and Didier (2020), which builds on Kalemli-Ozcan et al. (2015), to clean the raw data. Appendix B presents a detailed description of the cleaning routine that we implement to construct the financial module. The most important steps involve removing duplicates, dropping observations with limited financial information, eliminating firms with noisy data, filling time-invariant data gaps, harmonizing timeframe, deflating values, and harmonizing currencies to USD dollars. Orbis presents the financial information in one or two different formats: consolidated and/or unconsolidated format. The first one includes aggregated information of the parent and subsidiary companies, while the second one refers only to a parent or subsidiary firm. We used unconsolidated information as it reflects the activity of a firm in the country in which it operates. Further, The ISO country code embedded in the BvD identifier reflects the country of operation of the firm. The ORBIS database allows us to classify industries in the manufacturing sector according to their four-digit NACE Rev. 2 industry classification. Then, we merge the historical ownership module with a financial module using the BvD identifier. Orbis raw financial files contain detailed accounting information from harmonized balance sheets.

Table 1 presents summary statistics for our main State-ownership variables. Three conclusions can be drawn from Table 1. First, State participation in the economy– measured through both the proportion of SOEs relative to the total number of firms and the average government shareholding–displays an inverted U-shaped pattern over the analyzed period, which highlights a positive trend after 2012. Second, assuming a standard class of shares (e.g., 1 share grants 1 vote right), on average, the government controls the firm, as direct government shareholding accounts for two-thirds, approximately, of the firm. Third, although the proportion of SOEs is small relative to private-owned enterprises (POEs), SOEs are big market players. In order to understand the drivers behind the main trend i.e., stronger State presence in the economy, Table 2 unpacks State participation and explores its variation through the extensive and intensive margins. As Table 2 shows, variation goes in both directions and at both margins. However, the net effect points towards consolidation of State presence since 2012. Finally, Table 3 shows that SOEs have higher debt and equity levels than POEs.

Table 1: Summary Statistics - Ownership Variables

Variables	2010	2011	2012	2013	2014	2015	2016	Average
Proportion of SOE Firms	1.9%	1.9%	0.9%	1.0%	1.1%	1.9%	2.0%	1.5%
Average Govt. Shareholdings	72.5%	71.7%	72.8%	75.0%	76.9%	78.4%	80.3%	75.4%
Total Number of Frims	611,289	799,699	807,411	898,277	920,795	973,742	887,367	824,654
Total Number of SOEs	4,907	5,625	3,519	4,718	4,871	6,852	6,249	5,249

Note: The number of observations between 2010-2016 is 5,898,580. To obtain the values in this table, we calculate the statistic at the country level and then take the mean of the country statistic for each year. The statistic of the first column corresponds to the proportion of SOE firms in total firms. The statistic of the second column corresponds to the average level of government shareholdings in SOEs.

Table 2: Summary Statistics - Variation in State Ownership

Period	Extensive Margin				Intensive Margin				
	POEs →SOEs	POEs →SOEs (as a % of total POEs)	SOEs →POEs	SOEs →POEs (as a % of total SOEs)	Share of SOEs with Change in State Ownership %	% of SOEs with Positive Change relative to all SOEs with change	Average Positive Change in State Ownership %	% of SOEs with Negative Change relative to all SOEs with change	Average Negative Change in State Ownership %
2010 - 2011	685	0.1%	924	18.5%	6.4%	59.2%	6.2%	40.8%	-12.5%
2011 - 2012	732	0.1%	877	14.8%	4.3%	62.7%	9.9%	37.3%	-14.2%
2012 - 2013	1,337	0.2%	505	13.4%	6.8%	54.8%	13.3%	45.2%	-10.4%
2013 - 2014	494	0.1%	446	9.0%	6.2%	41.8%	12.7%	58.2%	-11.2%
2014 - 2015	1,988	0.2%	442	8.8%	6.7%	33.8%	13.4%	66.2%	-7.8%
2015 - 2016	448	0.1%	791	11.2%	5.4%	65.8%	6.7%	34.2%	-18.5%

Note: The number of observations between 2010-2016 is 5,898,580. Column 2 reports the number of POEs that became SOEs in the two-year period. Column 3 is the ratio (in percentages) of the number of POEs that became SOEs in the two-year period relative to the total number of SOEs in the first year of the two-year period. Column 4 reports the number of SOEs that became POEs in the two-year period. Column 5 is the ratio (in percentages) of the number of SOEs that became POEs in the two-year period relative to the total number of SOEs in the first year of the two-year period. Column 6 is the share of SOEs that changed state ownership shareholding percentage, but remained as SOEs, in the two-year period relative to the total number of SOEs in the first year of the two-year period. Column 7 is the share of SOEs that reported a positive change in state ownership shareholding percentage relative to all SOEs that reported a change in state ownership shareholding percentage. Column 8 reports the average positive change in state ownership shareholding percentage for SOEs that reported a change in shareholding percentage over the two-year period. Column 9 is the share of SOEs that reported a positive change in state ownership shareholding percentage relative to all SOEs that reported a change in state ownership shareholding percentage. Column 10 reports the average negative change in state ownership shareholding percentage for SOEs that reported a change in shareholding percentage over the two-year period.

Table 3: Summary Statistics - Financial Variables: SOEs vs. POEs

Variable	State-Owned Enterprise	Private-Owned Enterprise	p-value (t-test)
Debt	14.141	12.877	0.00000
Cost of Debt	0.653	0.644	0.00003
Equity	14.215	12.232	0.00000
Cost of Equity	0.513	0.585	0.00000
Number of Observations	36,741	5,861,839	5,898,580

Note: The number of observations between 2010-2016 is 5,898,580. The descriptive statistics for debt and equity are in natural logarithm. The descriptive statistics for the cost of debt and cost of equity are expressed as the natural logarithms of the firm-level cost normalized by the weighted average industry cost. Monetary values are in USD 2005. To obtain the values in this table, we calculate the average of each variable across countries and years. The third column shows the p-values for the t-test comparing means across state-owned enterprises and private-owned enterprises.

4. Model

This section develops the theoretical framework to guide the empirical analysis.

4.1. Setting and Technology

We consider a static monopolistic competition model with heterogeneous firms, which builds on the theoretical frameworks developed by Whited and Zhao (2021) and Hsieh and Klenow (2009). Following WZ, firms in our model use debt and equity to purchase the factors of production to create value-added. We denote value-added as Y, which is produced by a representative firm in a perfectly competitive market. The representative firm's production function is a Cobb-Douglas aggregator, which uses industry value-added Y_s as inputs, where $s \in \{1, ..., S\}$ denotes industry:

$$Y = \prod_{s=1}^{S} Y_s^{\theta}, \text{ where} \sum_{s=1}^{S} \theta_s = 1, \tag{1}$$

Industry value-added is itself a CES aggregator of value-added, Y_{si}, generated by M_s differentiated firms, with elasticity parameter σ:

$$Y_s = \left(\sum_{i=1}^{M_s} Y_{si}^{\frac{\sigma-1}{\sigma}} \right)^{\frac{\sigma}{\sigma-1}}. \tag{2}$$

Following WZ, we assume that debt and equity finance are aggregated into firm value-added using a CES production function:

$$Y_{si} = A_{si} \left(\alpha_s D_{si}^{\frac{\gamma_s-1}{\gamma_s}} + (1-\alpha_s) E_{si}^{\frac{\gamma_s-1}{\gamma_s}} \right)^{\frac{\gamma_s}{\gamma_s-1}}, \tag{3}$$

where D_{si} and E_{si} are a firm's level of debt and equity, respectively. The firm's total factor productivity is denoted by A_{si}. Parameter α_s represents the weight on the importance of debt in creating value-added and is equal to $\alpha_s = \frac{D_s^{\frac{1}{\gamma_s}}}{\left(D_s^{\frac{1}{\gamma_s}} + E_s^{\frac{1}{\gamma_s}}\right)}$. D_s is aggregate sector debt and E_s is aggregate sector equity. Parameter γ_s is the elasticity of substitution between debt and equity. The differentiated firm is a monopolist and maximizes its profits by choosing its price P_{si}, as well as debt and equity:

$$\pi_{si} = P_{si} Y_{si} - (1 + \tau_{Dsi}) R D_{si} - (1 + \tau_{Esi}) \lambda E_{si}, \tag{4}$$

where R and λ are the prices of financial resources. We define wedges τ_{Dsi} and τ_{Esi} as the financial market frictions that distort the costs associated with debt and equity, respectively.[8] Positive values for these wedges imply that firms face higher costs arising from frictions such as credit barriers or information asymmetry, while negative values correspond to distortions such as government subsidies or favorable financial connections.

Profit maximization yields the following first-order conditions, which equate marginal revenue products with marginal costs:

$$\{D_{si}\} \quad : \quad \frac{\sigma-1}{\sigma}\alpha_s \cdot \frac{P_{si}Y_{si}}{\left(\alpha_s D_{si}^{\frac{\gamma_s-1}{\gamma_s}} + (1-\alpha_s)\, E_{si}^{\frac{\gamma_s-1}{\gamma_s}}\right) D_{si}^{\frac{1}{\gamma_s}}} = (1+\tau_{Dsi})\, R, \tag{5}$$

$$\{E_{si}\} \quad : \quad \frac{\sigma-1}{\sigma}(1-\alpha_s) \cdot \frac{P_{si}Y_{si}}{\left(\alpha_s D_{si}^{\frac{\gamma_s-1}{\gamma_s}} + (1-\alpha_s)\, E_{si}^{\frac{\gamma_s-1}{\gamma_s}}\right) E_{si}^{\frac{1}{\gamma_s}}} = (1+\tau_{Esi})\, \lambda. \tag{6}$$

From equations (5) and (6), we can express the differentiated firm's optimal level of financing in terms of its wedges, prices of financial resources, and parameters:

$$Z_{si} \equiv \frac{D_{si}}{E_{si}} = \left[\frac{\alpha_s}{(1-\alpha_s)} \frac{(1+\tau_{Esi})\,\lambda}{(1+\tau_{Dsi})\,R}\right]^{\gamma_s}. \tag{7}$$

The optimal price of the differentiated firm is given by:

$$P_{si} = \frac{\sigma}{\sigma-1}\left[\frac{1}{A_{si}}\left((1+\tau_{Dsi})\,R\left(\alpha_s + (1-\alpha_s)\,Z_{si}^{-\frac{\gamma_s-1}{\gamma_s}}\right)^{-\frac{\gamma_s}{\gamma_s-1}} + (1+\tau_{Esi})\,\lambda\left(\alpha_s Z_{si}^{\frac{\gamma_s-1}{\gamma_s}} + (1-\alpha_s)\right)^{-\frac{\gamma_s}{\gamma_s-1}}\right)\right]. \tag{8}$$

[8] Since we are interested in identifying firms' wedges, we follow HK's approach instead of WZ's and assume that the prices of financial resources are not firm specific: $R_{si} = R$ and $\lambda_{si} = \lambda \; \forall \; i$.

Firm's optimal price is a markup of $\frac{\sigma}{\sigma-1}$ over the marginal cost of producing one unit of value-added, which corresponds to the term in brackets in equation (8).

Equilibrium allocation of resources across sectors implies that aggregate sector debt and equity are equal to $D_s = \sum_{i=1}^{M_s} D_{si}$ and $E_s = \sum_{i=1}^{M_s} E_{si}$, respectively. Using equations (5) and (6) and the equilibrium conditions of sector debt and equity, we express a firm's optimal debt and equity as:

$$D_{si} = \frac{\frac{P_{si}^{1-\sigma}}{\left[\alpha_s + (1-\alpha_s) Z_{si}^{-\frac{\gamma_s - 1}{\gamma_s}}\right](1+\tau_{Dsi})}}{\sum_{j=1}^{M_s} \frac{P_{sj}^{1-\sigma}}{\left[\alpha_s + (1-\alpha_s) Z_{sj}^{-\frac{\gamma_s - 1}{\gamma_s}}\right]\left(1+\tau_{Dsj}\right)}} \times D_s \tag{9}$$

$$E_{si} = \frac{\frac{P_{si}^{1-\sigma}}{\left[\alpha_s Z_{si}^{\frac{\gamma_s - 1}{\gamma_s}} + (1-\alpha_s)\right](1+\tau_{Esi})}}{\sum_{j=1}^{M_s} \frac{P_{sj}^{1-\sigma}}{\left[\alpha_s Z_{sj}^{\frac{\gamma_s - 1}{\gamma_s}} + (1-\alpha_s)\right]\left(1+\tau_{Esj}\right)}} \times E_s, \tag{10}$$

where Z_{si} and P_{si} are given by expressions (7) and (8) above.

As in Hsieh and Klenow (2009), we define revenue productivity, $TFPR_{si}$, as:

$$\begin{aligned} TFPR_{si} &= P_{si} A_{si} \\ \Longrightarrow TFPR_{si} &= \frac{\sigma}{\sigma - 1} \Bigg[\Bigg((1+\tau_{Dsi}) R \left(\alpha_s + (1-\alpha_s) Z_{si}^{-\frac{\gamma_s - 1}{\gamma_s}} \right)^{-\frac{\gamma_s}{\gamma_s - 1}} \\ &\quad + (1+\tau_{Esi}) \lambda \left(\alpha_s Z_{si}^{\frac{\gamma_s - 1}{\gamma_s}} + (1-\alpha_s) \right)^{-\frac{\gamma_s}{\gamma_s - 1}} \Bigg) \Bigg]. \end{aligned} \tag{11}$$

From equation (11), it can be inferred that revenue productivity is a weighted average of a firm's financial costs of debt and equity. Hence, we use revenue productivity as our measure of firms' average cost of financing.

4.2. Optimal Allocation of Financial Resources

Using the framework of WZ, we construct the optimal value-added for a differentiated firm, the sector, and the economy, under a counterfactual in which there are no financial market distortions. We assume that in this efficient allocation, total debt and equity in the sector are constant, but the social planner reallocates debt and equity across firms within the sector, in order to maximize sector value-added. First, the social planner maximizes the differentiated firm's value-added by choosing $\hat{D}_{si}$ and $\hat{E}_{si}$:

$$\hat{Y}_{si} = A_{si} \left(\alpha_s \hat{D}_{si}^{\frac{\gamma_s - 1}{\gamma_s}} + (1 - \alpha_s) \hat{E}_{si}^{\frac{\gamma_s - 1}{\gamma_s}} \right)^{\frac{\gamma_s}{\gamma_s - 1}}, \tag{12}$$

subject to $\hat{D}_{si} + \hat{E}_{si} = \bar{T}_{si}$, where $\bar{T}_{si}$is the total fixed amount of finance. The efficient level of financing for the differentiated firm is given by:

$$\frac{\hat{D}_{si}}{\hat{E}_{si}} = \left(\frac{\alpha_s}{1 - \alpha_s} \right)^{\gamma_s} = \frac{D_s}{E_s}. \tag{13}$$

With this efficient firm level of financing, the social planner maximizes sector value-added by allocating the total amount of sector debt and equity across firms within the sector. The optimality conditions of the efficient allocation are:

$$\hat{D}_{si} = \frac{A_{si}^{\sigma-1}}{\sum_{j=1}^{M_s} A_{sj}^{\sigma-1}} \times D_s, \tag{14}$$

$$\hat{E}_{si} = \frac{A_{si}^{\sigma-1}}{\sum_{j=1}^{M_s} A_{sj}^{\sigma-1}} \times E_s. \tag{15}$$

As can be observed in equations (14) and (15), the social planner allocates a larger share of debt and equity to firms with higher A_{si}. Analogous to equations (2) and (1), we define efficient sector value-added and aggregate value-added as:

$$\hat{Y}_s = \left(\sum_{i=1}^{M_s} \hat{Y}_{si}^{\frac{\sigma-1}{\sigma}} \right)^{\frac{\sigma}{\sigma-1}}, \tag{16}$$

$$\hat{Y} = \prod_{s=1}^{S} \hat{Y}_s^{\theta}. \tag{17}$$

Our measure of reallocation gains from eliminating distortions is given by:

$$\text{Total TFP Gains} = \left(\frac{\hat{Y}}{Y} - 1\right) \times 100 \tag{18}$$

4.3. Counterfactual Interventions

We are interested in studying a set of counterfactual interventions that allow us to quantify the role that state ownership and financial distortions have on aggregate productivity. For this, we use the framework developed in sections (4.1) and (4.2) to derive measures of reallocation gains similar to equation (18), but for the counterfactual policies we are interested in. We consider counterfactual interventions in which a subset of firms exit the market, such as the entire group of SOEs or a subset of SOEs based on some targeting policy.

Define X_s as the set of firms that exit sector s under a counterfactual intervention. We assume that the sectoral levels of debt, D_s, and equity, E_s, do not change, as in section (4.2), to only assess the gains arising from the reallocation of resources across firms that remain in the market. We express the optimal levels of firm debt and equity under a counterfactual scenario using variations of equations (9) and (10):

$$\tilde{D}_{si} = \frac{\frac{P_{si}^{1-\sigma}}{\left[\alpha_s+(1-\alpha_s)Z_{si}^{-\frac{\gamma_s-1}{\gamma_s}}\right](1+\tau_{Dsi})}}{\sum_{i\notin X_s} \frac{P_{sj}^{1-\sigma}}{\left[\alpha_s+(1-\alpha_s)Z_{sj}^{-\frac{\gamma_s-1}{\gamma_s}}\right]\left(1+\tau_{Dsj}\right)}} \times D_s \tag{19}$$

$$\tilde{E}_{si} = \frac{\frac{P_{si}^{1-\sigma}}{\left[\alpha_s Z_{si}^{\frac{\gamma_s-1}{\gamma_s}}+(1-\alpha_s)\right](1+\tau_{Esi})}}{\sum_{i\notin X_s} \frac{P_{sj}^{1-\sigma}}{\left[\alpha_s Z_{sj}^{\frac{\gamma_s-1}{\gamma_s}}+(1-\alpha_s)\right]\left(1+\tau_{Esj}\right)}} \times E_s. \tag{20}$$

The difference between equations (9) and (19) is that the summation in the denominator of the first term of the expression varies with respect to the number of firms in the sector. In equation, (9) the summation is for all firms in the sector, M_s, while in equation (19), the summation is for all firms in the sector except those that exit in the counterfactual scenario, X_s. The same criteria explain the differences between equations (10) and (20). As can be observed in the equations (19) and (20), firm debt and equity are a function of its wedges, prices of financial resources, and parameters. The firm-level output under counterfactual intervention is given by:

$$\tilde{Y}_{si} = A_{si}\left(\alpha_s \tilde{D}_{si}^{\frac{\gamma_s-1}{\gamma_s}} + (1-\alpha_s)\,\tilde{E}_{si}^{\frac{\gamma_s-1}{\gamma_s}}\right)^{\frac{\gamma_s}{\gamma_s-1}}, \tag{21}$$

Analogous to equations (2) and (1), we define sector value-added and aggregate value-added as:

$$\tilde{Y}_s = \left(\sum_{i\notin X_s} \tilde{Y}_{si}^{\frac{\sigma-1}{\sigma}}\right)^{\frac{\sigma}{\sigma-1}}, \tag{22}$$

$$\tilde{Y} = \prod_{s=1}^{S} \tilde{Y}_s^{\theta}. \tag{23}$$

The counterfactual scenario described above is an economy in which a set of firms are excluded from the market, X_s, but distortions still persist for firms that remain in the market. The reallocation gains between this counterfactual scenario and an economy characterized by all firms, M_s, as well as their respective financial distortions is given by:

$$\text{Gains of Counterfactual with Distortions} = \left(\frac{\frac{\tilde{Y}}{\prod_{s=1}^{S}\left[\left(M_s-\sum_{i=1}^{M_s}\mathbb{I}_{\{i\in X_s\}}\right)^{\frac{\sigma}{\sigma-1}}\right]^{\theta_s}}}{\frac{Y}{\prod_{s=1}^{S}\left[(M_s)^{\frac{\sigma}{\sigma-1}}\right]^{\theta_s}}} - 1\right)\times 100. \tag{24}$$

The terms $\prod_{s=1}^{S}\left[(M_s)^{\frac{\sigma}{\sigma-1}}\right]^{\theta_s}$ and $\prod_{s=1}^{S}\left[\left(M_s-\sum_{i=1}^{M_s}\mathbb{I}_{\{i\in X_s\}}\right)^{\frac{\sigma}{\sigma-1}}\right]^{\theta_s}$ in equation (24) adjust for the difference in the number of varieties (i.e. number of firms) between the two economies that affect the level of sector and aggregate value added.[9] Equation (24) measures the reallocation gains that arise from the exit of X_s from the market.

Additionally, we can also consider an intervention in which a set of X_s firms exit the market and financial distortions are absent. In this case, we express the efficient allocations of debt and equity as well as firm-level output as:

$$\tilde{\hat{D}}_{si} = \frac{A_{si}^{\sigma-1}}{\sum_{i \notin X_s} A_{sj}^{\sigma-1}} \times D_s, \tag{25}$$

$$\tilde{\hat{E}}_{si} = \frac{A_{si}^{\sigma-1}}{\sum_{i \notin X_s} A_{sj}^{\sigma-1}} \times E_s. \tag{26}$$

$$\tilde{\hat{Y}}_{si} = A_{si} \left(\alpha_s \tilde{\hat{D}}_{si}^{\frac{\gamma_s - 1}{\gamma_s}} + (1 - \alpha_s) \tilde{\hat{E}}_{si}^{\frac{\gamma_s - 1}{\gamma_s}} \right)^{\frac{\gamma_s}{\gamma_s - 1}}. \tag{27}$$

Aggregates under this counterfactual scenario can be expressed similarly to equations (22) and (23). The reallocation gains between this counterfactual scenario and an economy characterized by all firms, M_s, as well as their respective financial distortions are given by:

$$\text{Gains of Counterfactual without Distortions} = \left(\frac{\frac{\tilde{\hat{Y}}}{\prod_{s=1}^{S} \left[\left(M_s - \sum_{i=1}^{M_s} \mathbb{I}_{\{\sqsupset \in \mathbb{X}_{\sim}\}} \right)^{\frac{\sigma}{\sigma-1}} \right]^{\theta_s}}}{\frac{Y}{\prod_{s=1}^{S} \left[(M_s)^{\frac{\sigma}{\sigma-1}} \right]^{\theta_s}}} - 1 \right) \times 100. \tag{28}$$

4.4. Measurement and Calibration

We measure nominal value-added, $P_{si}Y_{si}$as the difference between sales and intermediate inputs. Our measure of debt, D_{si}, is equal to the sum of two variables in the Orbis database: short-term debt and long-term debt. Equity, E_{si}, is measured with a variable named total shareholder's funds. We calibrate the prices of financial

[9] $\mathbb{I}_{\{i \in X_s\}}$ is an indicator function that takes the value of 1 if $i \in X_s$.

resources to $R = 0.1$ and $\lambda = 0.1$. We follow WZ in the calibration of σ and γ_s. That is, we set σ to 1.77, which is the calibrated value by WZ for the United States. Also, we estimate the elasticity of substitution between debt and equity, γ_s, at the sector level, using an extension of Kmenta (1967), which is a non-linear regression of value-added on equity and debt with firm fixed-effects. Last, we do not observe A_{si}. However, following WZ, we can express and measure A_{si} as:

$$A_{si} = \frac{(P_{si}Y_{si})^{\frac{\sigma}{\sigma-1}}}{\left(\alpha_s D_{si}^{\frac{\gamma_s-1}{\gamma_s}} + (1-\alpha_s) E_{si}^{\frac{\gamma_s-1}{\gamma_s}}\right)}. \tag{29}$$

Using equations (5) and (6), we calibrate firm wedges $(1+\tau_{Dsi})$ and $(1+\tau_{Esi})$ with our measures of $P_{si}Y_{si}$, D_{si}, E_{si}, prices of financial resources, and calibrated parameters. Last, we calculate revenue productivity, $TFPR_{si}$ using equation (11) with the variables and calibrated parameters described above.

5. Empirical Strategy

To examine the effect of State ownership on the cost of finance, we estimate the following equation:

$$\begin{aligned} \ln\left(\text{Cost of Cap}_{isc,t}\right) = \alpha + \beta \text{State Own.}_{isc,t} + \gamma \text{Publicly Listed}_{isc,t} \times \text{State Own.}_{ics,t} \\ + \kappa X_{isc,t} + \lambda_i + \lambda_{s,t} + \lambda_c + u_{isc,t}. \end{aligned} \tag{30}$$

Variable Cost of $\text{Cap}_{csi,t}$ measures the cost of finance for a firm i that operates in sector s and is located in the country c at time t. It is a weighted average of the cost of debt and equity, where the weights capture the relative importance of debt and equity in the firm i's total liabilities. Our variable of interest, State $\text{Ownership}_{csi,t}$, captures the total direct shares owned by the State. Variable *PubliclyListed* is a dichotomous variable that takes value 1 if firm i is publicly listed and 0 otherwise.[10] Vector $X_{csi,t}$ includes control variables such as firm size (ln assets), age, and productivity (log TFPQ). Given data

[10]To identify publicly listed firms, we use the variable "Listed" from Orbis, classifies firms into three categories: Listed, Delisted, Non-listed. We consider a firm listed if it is labeled as "Listed".

limitations, we were not able to follow Merton (1974) to construct default measures to control for credit quality, which is an important control to identify our main effect. We address this concern by including firm fixed effects. Although default measures vary over time, they are related to firms' fundamentals, which often display little variation during relatively short periods of time, as the one we consider. We also include sector-time fixed effects to control for industry trends that may affect credit and equity costs (e.g., trade, technological change), as well as country fixed effects to control for the quality of financial institutions and sovereign risk.

6. Empirical Results

This section presents the main empirical findings. We start by describing the results from estimating our main specification for the entire sample. Then, we explore heterogeneous effects across sectors. Table 4 presents the results from estimating equation (30). Columns (1) to (5) display the results from OLS regressions, while column (6) reports the one corresponding to an IV regression. To control for potential sources of endogeneity, we lagged all the right-hand side variables for one period, with the exception of age.

On average, a 1 p.p increase in government shareholding reduces SOEs' cost of finance by 0.08 percent when we don't control by endogeneity and 0.02 when we do so. In the IV regression, the State ownership financial subsidy is, on average, the same for publicly listed and non-publicly listed SOEs. In line with previous evidence, large and mature firms face a lower cost of accessing finance than small and young firms. However, high-productivity firms have, unexpectedly, a higher financial cost than low-productivity ones.

To explore heterogeneous effects across sectors, we split the sample and run separate regressions at the sectoral level. Table 5 presents the results from estimating equation (30) for each sector, separately. The top panel of Table 5 displays the results from OLS regressions, while the bottom panel presents those corresponding to the IV ones. As the bottom panel of Table 5 shows, SOEs in sectors such as agriculture, electricity, water, transport, finance, and real estate get, on average, subsidized access to finance. The average financial premium varies between 0.05 p.p for a sector like transport to 3.73 p.p for a sector like finance.

Table 4: Financial Premium (Tax) of Bureaucrats in Business

	(1)	(2)	(3)	(4)	(5)	(6)
	(OLS)	(OLS)	(OLS)	(OLS)	(OLS)	(IV)
State Ownership	-0.0001	-0.0001	-0.0001	-0.0002***	-0.0008***	-0.0002***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0000)	(0.0001)
Publicly Listed=1 X State Ownership		-0.0006	-0.0006	-0.0004	-0.0009**	0.0002
		(0.0006)	(0.0006)	(0.0006)	(0.0004)	(0.0007)
Age			-0.0345***	-0.0559***	0.0134***	-0.0181*
			(0.0090)	(0.0099)	(0.0034)	(0.0094)
Log(Total Assets)				-0.3301***	-0.5425***	-0.1623***
				(0.0009)	(0.0003)	(0.0011)
Log(TFPQ)					0.4055***	0.0666***
					(0.0001)	(0.0004)
Observations	5898580	5898580	5898580	5898580	5898580	4090426
Country fixed effects	Y	Y	Y	Y	Y	Y
Firm fixed effects	Y	Y	Y	Y	Y	Y
Industry-time fixed effects	Y	Y	Y	Y	Y	Y

Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 5: Financial Premium (Tax) of Bureaucrats in Business: Sectoral Analysis

	Agriculture	Mining	Manufacturing	Electricity	Water Supply	Construction	Wholesale	Transport
OLS								
State Ownership	-0.0003***	-0.0016***	-0.0015***	-0.0003***	-0.0007***	-0.0007***	-0.0008***	-0.0011***
	(0.0001)	(0.0005)	(0.0002)	(0.0001)	(0.0001)	(0.0001)	(0.0002)	(0.0001)
Publicly Listed=1 X State Ownership	-0.0033***	-0.0037	-0.0003	0.0007	0.0003	-0.0011*	-0.0026	-0.0026
	(0.0009)	(0.0033)	(0.0008)	(0.0007)	(0.0003)	(0.0006)	(0.0023)	(0.0025)
Observations	169462	20861	1357513	21308	51468	757853	1797259	308537
IV								
State Ownership lag	-0.0009***	-0.0001	-0.0001	-0.0007***	-0.0006***	0.0001	-0.0003	-0.0005**
	(0.0002)	(0.0014)	(0.0003)	(0.0002)	(0.0001)	(0.0003)	(0.0003)	(0.0002)
Publicly Listed lag=1 X State Ownership lag	0.0048	0.0000	0.0017	-0.0005	0.0010	-0.0030	-0.0020	-0.0048*
	(0.0033)	(.)	(0.0019)	(0.0013)	(0.0008)	(0.0029)	(0.0026)	(0.0025)
Observations	117901	14845	998859	14713	37033	500402	1265149	212958
Age	N	N	Y	Y	Y	Y	Y	Y
Log(Total Assets)	Y	Y	Y	Y	Y	Y	Y	Y
Log(TFPQ)	Y	Y	Y	Y	Y	Y	Y	Y
Country fixed effects	Y	Y	Y	Y	Y	Y	Y	Y
Firm fixed effects	Y	Y	Y	Y	Y	Y	Y	Y
Industry-time fixed effects	Y	Y	Y	Y	Y	Y	Y	Y

Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

Table 5: Financial Premium (Tax) of Bureaucrats in Business: Sectorial Analysis (Con't)

	Accommodation	Communication	Finance	Real Estate	Professional
OLS					
State Ownership	-0.0013***	-0.0009***	-0.0027***	-0.0006***	-0.0019***
	(0.0002)	(0.0002)	(0.0008)	(0.0001)	(0.0001)
Publicly Listed=1 X State Ownership	0.0013	0.0012	0.0000	-0.0020	0.0002
	(0.0016)	(0.0012)	(.)	(0.0020)	(0.0012)
Observations	334932	211263	897	120538	407291
IV					
State Ownership lag	-0.0005	-0.0004	-0.0373**	0.0012***	-0.0000
	(0.0004)	(0.0004)	(0.0147)	(0.0003)	(0.0002)
Publicly Listed lag=1 X State Ownership lag	0.0085	0.0017*	0.0000	-0.0054***	0.0028
	(0.0073)	(0.0009)	(.)	(0.0015)	(0.0035)
Observations	219526	143819	419	74968	269244
Age	Y	Y	N	Y	Y
Log(Total Assets)	Y	Y	Y	Y	Y
Log(TFPQ)	Y	Y	Y	Y	Y
Country fixed effects	Y	Y	Y	Y	Y
Firm fixed effects	Y	Y	Y	Y	Y
Industry-time fixed effects	Y	Y	Y	Y	Y

Standard errors in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$.

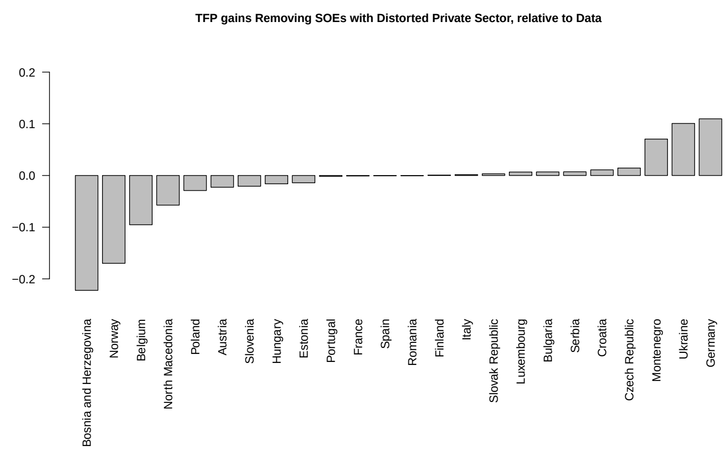
7. Productivity Gains from Removing SOEs Distortions

In our empirical analysis, we document a robust and statistically significant implicit subsidy on the SOEs' average cost of finance relative to private firms. In this section, we complement the regression-based estimates by proposing a series of policy counterfactuals aimed at quantifying the effects of these subsidies on Total Factor Productivity. More concretely, we consider alternative equilibrium stationary allocations where all or subsets of the SOEs are shut down and their financial resources reallocated back into the private sector. Are there aggregate TFP gains to be reaped by this policy? How much do the resulting gains or losses depend on whether the reallocation takes place under distorted or undistorted credit markets? Is there any merit to targeted interventions where only poor-performing SOEs are closed?

Our first counterfactual characterizes an extreme scenario where the SOEs are shut down and the private sector remains subject to the same distortions in the allocation of financial resources. By closing government-run enterprises, additional financing can be channeled toward the private sector. However, because of persisting financial frictions, such reallocation will be inefficient. While unrealistic, this counterfactual is instructive to emphasize the importance of complementarities in the implementation of structural reforms.[11]

[11] Given the love for variety inherent to a CES demand system, any policy that reduces the number of firms exerts a negative contribution to TFP. In our counterfactuals, we shut down the variety channel by aggregating TFP only across the firms that remain active in the baseline and the counterfactual allocations. See section 4.3 for formal definitions.

Figure 2: TFP gains No SOEs, Distorted Capital Markets

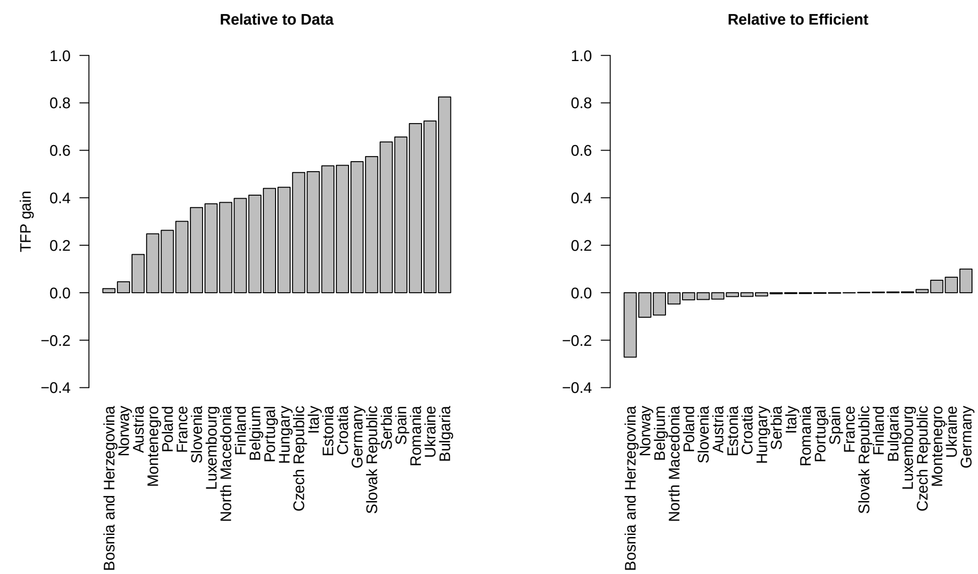


Note: TFP gains from removing SOEs from the economy, while preserving financial frictions in credit markets.

The cross-country distribution of TFP gains arising from the first counterfactual is illustrated in figure 2. A revealing pattern in the figure is that the experiment of eliminating SOEs and reallocating finance towards the private sector subject to financial frictions leads to moderate gains in some economies and moderate losses in many others. Given the prior that private firms outperform government-run firms, it may seem counter-intuitive that countries lose by removing the SOEs. Two forces are behind the results. Firstly, even if private firms were more productive than government-run ones, the severity of financial distortions could be so extreme that further reallocating finance towards the private sector is productivity-reducing. Secondly, it may be that the prior is unrealistic and, in fact, SOEs are on average more productive than their private counterparts. The next counterfactuals are aimed at disentangling these forces.

To this end, consider next a scenario where SOEs are closed down at the same time financial markets are reformed so that debt and equity are efficiently allocated across firms. Because two features of the economy are changing simultaneously, we compare the gains from these reforms against two alternative benchmarks: a) the observed allocation in the data, which exhibits SOEs and financial frictions, and b) the efficient allocation without financial frictions, but with active government enterprises. The former normalization portrays the combined productivity gains from the reforms, while the latter isolates the gains from the SOE elimination only.

Figure 3: TFP gains No SOEs, Undistorted Capital Markets

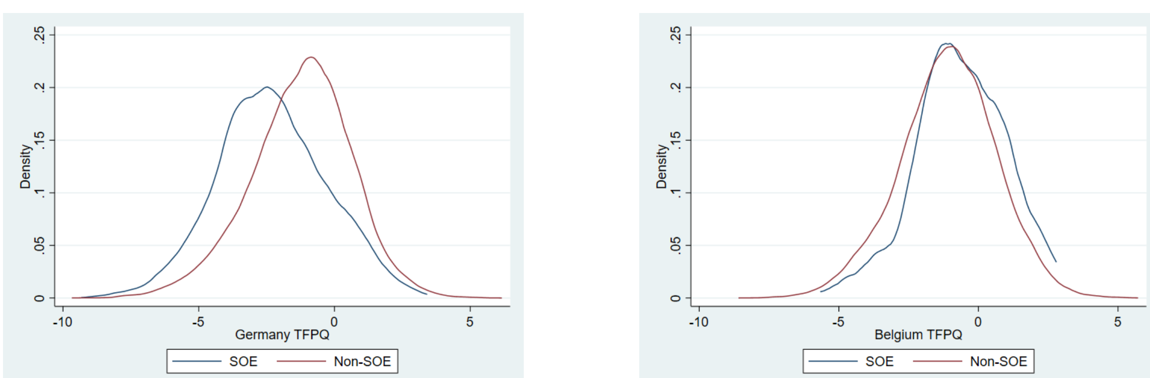


Note: TFP gains from removing SOEs from the economy under undistorted financial markets. The left panel report the TFP in the counterfactual economy relative to the one observed in the data, with both SOEs and distorted financial markets. The right panel illustrates the gain of the counterfactual relative to another hypothetical economy with SOEs but no distortions in financial markets. The numbers reported in the histogram correspond to the average for each country across all years in our sample

Figure 3 illustrates the TFP gains resulting from the proposed counterfactual. In the panel to the left, we observe sizable productivity gains arising from reforming financial markets, closing SOEs, and letting the private sector absorb the resulting funds, relative to the allocation of resources in the data where financial frictions and SOEs interact. To decompose these large gains into those stemming from the SOE elimination and those implied by the financial liberalization only, the panel to the right illustrates the gains relative to an economy with no financial frictions, but with SOEs. That is, the benchmark allocation underlying the right panel is one where there are SOEs but no financial misallocation, and then reform is implemented that closes down SOEs. The figure shows that, while some countries would still experience an increase in aggregate productivity, many others would suffer a TFP loss, while for the majority the effect would be negligible. Since all that changed was that SOEs were closed, countries whose TFP fell in the counterfactual must be economies where SOEs outperform the private sector. An important message that emerges from this scenario is that an indiscriminate shutdown of government-run businesses could be counterproductive.

To validate the claim that SOEs outperform private firms in cases where shutting down SOEs led to productivity losses, figure 4 plots the densities of the physical productivity distributions ($TFPQ$) across government-run and private firms in two salient countries in figure 3: Belgium and Germany. [12] More specifically, we illustrate the distributions of $log\left(\frac{A_{si}}{A_s}\right)$, as defined in equation 29, for private and government-run firms. As readily seen in the figure, SOEs are widely outperformed by their private sector counterparts in Germany (left panel) whereas the converse is true in Belgium (right panel), rationalizing that the former gains from a policy that withdraws state enterprises while the latter loses.

Figure 4: Distribution of $TFPQ$: SOE vs Private Firms

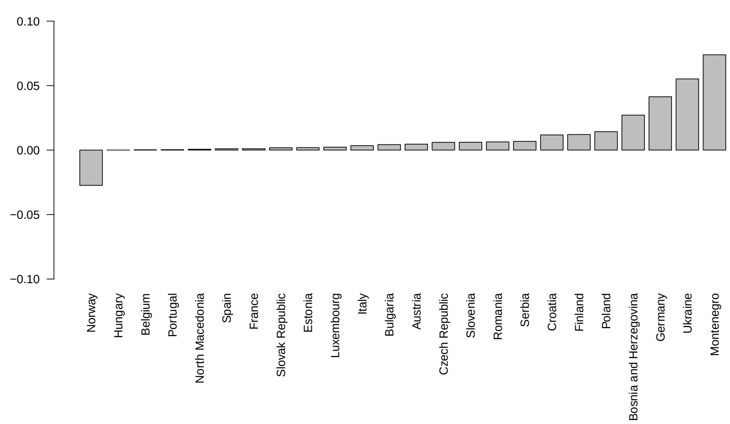


The conclusion from the previous scenario motivates us to consider targeted in-

[12]While the point being made is most eloquently portrayed in Germany and Belgium, the same rationalization of the patterns described in figure 3 could be obtained by inspecting the distribution of productivities in any other country in the sample.

terventions where SOEs are shut down based on their performance relative to their private-sector peers. In the distorted economy, the one we observe in the data, a firm's relative performance is given by its debt and equity demands, which are a function of the physical productivity of the firm and the idiosyncratic distortions (equations (19) and (20)). Therefore, we design the targeted intervention to close down the SOEs whose debt and equity demands are below the median demand among the private sector enterprises in the same country and industry. Notice that the targeting strategy may result in no SOEs being shut down at all.

Figure 5: TFP gains Targeted SOE Intervention, Relative to Data

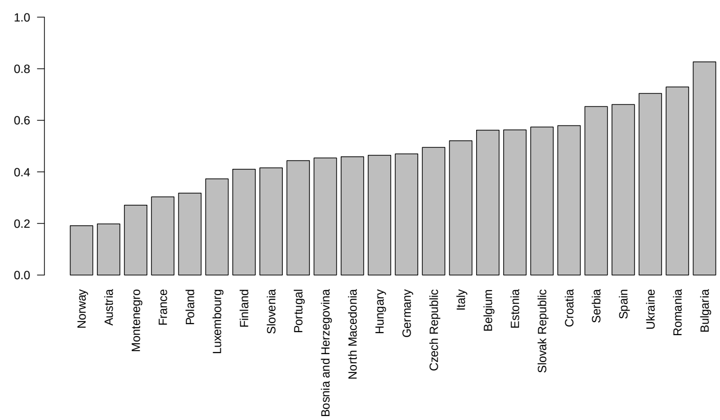


Note: TFP gains from a targeted removal of the SOEs with debt and equity levels below the median level among private sector enterprises in the same industry and country. The TFP gains in the counterfactual economy are measured relative to the distorted allocation we observe in the data, with both SOEs and financial frictions. The numbers reported in the histogram correspond to the average for each country across all years in our sample.

The results illustrated in figure 5 dictate that once the interventions are targeted at under-performing SOEs, all countries with the exception of Norway see their aggregate productivity increase moderately in response to this policy. The gains are moderate, and in one case negative, because despite reallocating resources away from poorly performing firms, the reallocation takes place in distorted financial markets. If financial distortions among the private sector and surviving SOEs are relatively more severe, aggregate productivity declines in response to the intervention. Overall, however, the targeted intervention proves to be more effective at raising aggregate productivity than an indiscriminate elimination of government-run firms.

In our final counterfactual, then, we consider a scenario where the targeted SOE intervention is implemented alongside a reform that withdraws all distortions from financial markets. In this case, the reallocation of the financing absorbed by the underperforming SOEs is conducted efficiently. We see in figure 6 that targeted SOE interventions combined with financial reforms lead to gains in every country.

Figure 6: TFP gains Targeted SOE Intervention in Undistorted Credit Markets



Note: TFP gains from a targeted removal of SOEs with debt and equity levels below the median among private sector enterprises in the same industry and country. The TFP gains in the counterfactual economy are measured relative to another hypothetical economy with all SOEs and no distortions in financial markets. The numbers reported in the histogram correspond to the average for each country across all years in our sample

8. Conclusion

For more than a century, economists have debated the rationale and potential real effects of State participation in the economy. Despite the latest privatization waves and further structural reforms, which broadly mirrored the global consensus about the need of shrinking a bossy business government, in an attempt of making developing countries fiscally accountable, the State footprint remains indelible. Evidence about the distortionary effect of State ownership on economic outcomes is, however, surprisingly thin and, mainly, focused on China. Moreover, little research has been conducted to identify the channels through which State ownership affects economic outcomes and the potential reforms that can maximize output at the aggregate level. This paper comes to fill this gap.

The paper finds that, on average, SOEs get cheaper access to finance than POEs. However, there is a heterogeneous financial treatment of SOEs across markets. Moreover, we show that indiscriminate interventions aimed at dismantling SOEs may backfire in economies where government-run enterprises outperform private-sector peers and where severe financial distortions remain in place. Leveraging the theoretical underpinnings of our analysis, we constructed counterfactual allocations where SOEs were shut down under alternative assumptions about distortions in credit markets. We found that in many economies, SOEs perform relatively well compared to private sector peers, hence their dismantlement would not translate into aggregate gains. Targeting SOEs reform to dismantle those with relatively poor performance increases the number of countries benefiting from these policies. Nonetheless, as expected, all interventions will translate into larger efficiency gains if accompanied by financial market reforms that improve the allocation of credit across all types of firms.

Appendix A. Historical Ownership Data Cleaning Procedure

The first stage to develop the historical ownership module involves a sequence of cleaning steps that has to be applied to the Vintage files (e.g., Linkages and Entities) to make them usable. To do so, we follow Cusolito (2020). First, we merge all the Links files for the analyze period and harmonized the date frame, as BvD Link file date may not coincide with the date the information was collected. We applied the following rule to match ownership data to each year: within the information set of a subsidiary, identify the latest month that appear in the information-date variable.If the latest month is June or later, then assign to the subsidiary the year of the Links file. Otherwise, assign the ownership stake to the previous year of the Links file. We did so to keep consistency with the timing rule applied when cleaning the financial information. Second, remove duplicates and keep the most updated information. Third, replace BvD codes on ownership stakes with numeric values. Several times BvD has missing information about the ownership shareholding of a subsidiary. However, through secondary sources, it gets imprecise, though valuable information, which is used to characterize a shareholder-subsidiary link. The following table presents the codes used by BvD, their meaning, and the numeric value we attributed to each link.

Table A.6: BvD Ownership Codes

BvD code	Meaning	Definition	Numeric Value Assigned
WO	Wholly Owned	The shareholder has at least 98% of the company	98%
MO	Majority Owned	The shareholder has at least 50.01% of the company	50.01%
JO	Jointly Owned	The shareholder has 50% of the company	50%
CQP1	General Partner	The shareholder has 50% of the company plus 1 share	50.01%
NG	Negligible	The shareholder has 0.01% of the shares or less than that	.

Appendix B. Historical Financial Data Cleaning Procedure

Following Cusolito and Didier (2020), we document the steps we apply to clean the financial information.

1. *Fill time-invariant data gaps*: for a given BvD.ID-year combination, with BvD.ID standing for firm unique identifier, replace missing highly-likely time-invariant information with information available for previous years (e.g., US SIC code,

NAICS, NACE, NACE main sector, company name, city, region, postal code, legal form, incorporation date, thicker, isin). To perform this step, the team first worked with auxiliary raw tables, which collect legal and sectoral information of the firm, and collapsed the time-invariant variables at the BvD.ID level.

2. *Harmonize timeframe*: convert variable closedate from string to numeric format. Then create a new variable, name it year, and assign a year to the observation according to the following rule. If closing month corresponding to the observation is June or any other month after June, then make Year take the year reported in closedate. Otherwise, make Year the year reported in closedate minus 1.

3. *Drop duplicates*: the raw database presents a large number of duplicates at the BvD.ID-year level. The team noticed that the information was the same, except in the SIC primary code variable. Thus, we collapsed all the SIC primary codes reported by the same BvD.ID-year in one variable, using semicolons to list all the SIC primary codes, and eliminated duplicates.

4. *Drop firms with missing relevant information*: drop all the firms with no information for the following set of variables: US SIC code, NAICS, NACE core code, NACE main sector.

5. *Drop observations with missing information for the currency code*: eliminate observations with missing information for the currency code.

6. *Drop observations with missing information for variable closedate*: eliminate observations with missing information for the close date of the financial statement.

7. *Drop observations with relevant missing information* eliminate observations that at the BvD.ID-year level have missing information in all the following variables: operating revenue (turnover), sales, employment, total assets.

8. *Drop duplicates and keep most updated information*: keep observations with the most recent closing date if there are duplicates at the BvD.ID-year-first letter of consolidation code (e.g., C, U) level.

9. *Drop duplicates and keep information from annual reports*: keep observations with annual report in *Use FillingType* variable if there are still duplicates and keep the standardized information. Using annual reports (IFRS preferred, instead of local reports) guarantees standardization of reporting protocol at international level.

10. *Eliminate firms with noisy data*: drop all the observations corresponding to a specific BvD.ID if any of the following variables has a negative value in a specific year – total fixed assets, tangible fixed assets, intangible fixed assets, other fixed assets, current assets, sales, and employment.

11. *Deflate values*: use country GDP deflators from the World Bank database to deflate nominal variables and set year 2005 as the base year.[13]

12. *Harmonize currencies*: convert values in local currency to USD dollars, using the average of the monthly exchange rate for year 2005.

[13] https://data.worldbank.org/indicator/NY.GDP.DEFL.ZS.

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